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The Journal *of* Orthopædic Surgery

THE ABDUCTION METHOD CONSIDERED AS THE STANDARD ROUTINE IN THE TREATMENT OF FRACTURE OF THE NECK OF THE FEMUR.

BY ROYAL WHITMAN, M. D., NEW YORK

Read at a Meeting of the American Orthopedic Association June 9, 1920.

The purpose of treatment of a fracture is to restore function. For this, the essentials are correction of deformity, fixation of the fragments until security is assured, supplemented by protection during the period of reconstruction.

This purpose has never governed the treatment of fracture of the neck of the femur—ostensibly, because the mechanical conditions made it impracticable or because it would endanger life or because the tissues being incapable of repair, it would be futile. Actually, because the means at command have been inadequate to apply it. This statement may be easily verified since the basis of all treatment in common use is traction on the limb. Traction, if properly applied and supervised, may be efficient in the treatment of fracture of the shaft of the femur because the tension on the ensheathing muscles aids in alignment and because security is soon assured by external callus. It is not efficient for fracture of the projecting neck because it can at best appose the fragments in a lateral, and therefore, insecure relation. Repair is not aided by external callus but must proceed from the interior and it requires, therefore, the quality of fixation that can only be assured by direct pressure.

The adaptation of the rules of practice to defective mechanics, the point of view from which the treatment is considered, and the results estimated may be illustrated by quotations from representative writers on fractures.

"Restoration of form and function is rarely to be attempted or even sought."

"The first indication is to save life, the second to get union, the third to correct or diminish displacements."

"It is a crime to disturb an impaction in reasonably good position."

"Intra Capsular fractures practically never unite by bone."

"Our prognosis must always be unfavorable. In many instances, the injury soon proves fatal and in all, the functions of the limb are forever impaired—no matter whether the fracture has taken place within, or external to the capsule, whether it has united by ligament or bone, shortening of the limb and lameness are the inevitable results."

Under these conditions treatment has always been perfunctory in character. This is best illustrated in hospital practice but apparently it is no more efficient in the country at large, since it is stated that of 120 cases of ununited fracture at the hip observed at the Mayo Clinic not one had been treated properly at the time of the injury. The results, as compared to those of other fractures, are extraordinarily bad, yet paradoxical as it may seem, these results are the chief support of the treatment that produced them because they are accepted as evidence of incapacity for repair and therefore of the futility of surgical efficiency.

The abduction treatment presents an absolute contrast in every particular to conventional teaching and practice, because it is based on adequate mechanics. By this method, fracture of the neck of the femur is treated on surgical principles and as the fracture above all others in which the result is most directly determined by character of the treatment and by the skill of the one who conducts it. It displaces, therefore, not merely conventional methods as inadequate to apply these principles but all the theories, customs and traditions that have served thus far by confusing the relation of cause and effect to uphold incompetence and neglect. Radical and revolutionary as the statement may appear, it is in substance, simply that opportunity is essential to repair—that since conventional treatment is inadequate to assure this essential, conclusions based on the results are of no scientific value.

It is from this standpoint, as the exponent of reform, that the abduction treatment is presented for consideration, and as such, a sketch of its evolution may be of interest.

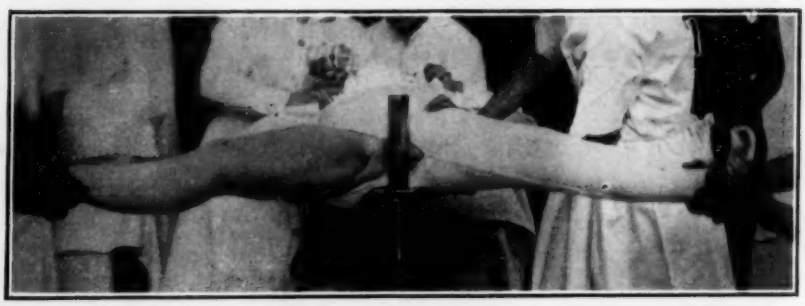
Its inception dates from 1890—when the first of a series of cases of fracture of the neck of the femur in childhood was identified. At that time, the fracture in early life, now known to be not infrequent, was mentioned in treatises as a surgical curiosity and supposed to occur only as an epiphyseal separation, on the assumption that weakness at this joint could alone explain an injury which was characteristic of the atrophy of old age. In the cases first observed, the fracture was incomplete, the repair was rapid and the immediate results were classed as good because the effect of deformity on function had not then been analysed. Further observation through a period of years brought to light the important fact that the deformity of the neck of the femur, now familiar as traumatic coxa vara, caused direct disability by limiting the range of motion and that in this class of cases, it was progressive, requiring eventually operative relief, indicating therefore, that it should have been corrected at the time of the injury, had there been any means for its accomplishment. It was further demonstrated that conventional treatment was almost equally inadequate for complete central fracture, although there could be no question of the capacity for repair. If therefore, children suffered the same penalties as adults for defective treatment, it was evident that defective treatment rather than defective nutrition must be the primary cause of failure both in young and old.

It was not until twelve years later that the abduction method was devised. It was first applied in a class of cases in which technical efficiency was the only consideration, then tentatively to those of the less favorable type, until it has now been demonstrated by the experience of eighteen years that repair under all conditions is primarily a question of opportunity. The only question is, whether the patient is of the operable or inoperable class. Personally, I do not admit an age limit for repair, and I believe that a treatment which relieves pain, prevents bed sores, and holds out to the patient a prospect of restored function is, as a rule, more conservative from the life saving standpoint, than neglect and its consequences.

The purpose of this paper, however, in the interest of prac-

tical reform, is to establish an efficient treatment for fracture of the neck of the femur in the class of cases now inefficiently treated, a vital issue that must not be obscured by discussion on the limits of its practicability. The abduction treatment is doubtless familiar to members of this association and I shall present only a brief sketch of its principles and of the manner in which it is applied.

The patient having been anaesthetized is placed on a pelvic support with a perineal bar, the shoulders resting on a box of equal height. Two assistants make manual traction on the extended limbs, drawing the perineum firmly against the bar and



reducing the shortening on the injured side, as demonstrated by measurement; the surgeon meanwhile lifting the thigh upward if it is below the plane of its fellow. The limb is then rotated slightly inward, thus completely apposing the fragments. Both limbs, extended and under manual traction, are then abducted to the full limit, on the sound side first, to demonstrate the normal range and to balance the pelvis. When this limit is approached on the injured side, the tension on the capsule aligns the fragments in a horizontal plane, and as the inner, or head fragment, is fixed by the acetabulum, finally forces the neck fragment against it. This mutual pressure is the first essential of stability, and it is further assured (in central fractures) by the inclusion of the line of fracture beneath the acetabular rim, by the apposition of the trochanter and the side of the pelvis, and finally by the absolute muscular impotence incidental to complete abduction. A long plaster spica is then applied which by fixing the limb in complete abduction, full extension, and slight inward rotation, insures the continued effectiveness of the anatomical splinting. If the fracture is incomplete or

impacted, the neck in its relation to the shaft, is usually displaced backward and downward, and whenever the deformity is sufficient to seriously impair the normal range of motion, it should be corrected.

In most instances, by the manipulation described, the shortening of the so-called impaction may be as easily reduced as if the separation were manifestly complete. If, however, the resistance is greater as in the incomplete fractures of childhood, or when treatment has been delayed, manual traction is supplemented by downward pressure on the projecting trochanter and more effectively by natural leverage.

For since the range of normal abduction is dependent upon the upward inclination of the neck of the femur, its depression must limit abduction by contact with the upper border of the acetabulum. This contact fixes the neck and by the leverage of the extended limb against this fulcrum the limb may be abducted, and then rotated inward to the required degree. In other words, the displaced neck is in a relation to the acetabulum, which under normal conditions would require abduction and inward rotation of the shaft. To correct the deformity, therefore, one must adjust the shaft to the neck by inward rotation and abduction of the limb. The plaster spica is then applied, assuring immediate fixation. Correction of deformity in this manner far from obstructing repair, is the most effective means of promoting it, since restoration of the normal contour apposes the fractured surfaces, which were separated by the distortion.

The subsequent treatment is the same for all forms of fracture. The head of the bed is raised one or two feet, an inclination which as contrasted with that required for traction, is far more comfortable and because of its influence on the blood supply more favorable to repair. The patient is turned at intervals from side to side and completely over to the ventral position, without discomfort or danger of displacement, thus bed sores and hypostatic congestion may be prevented. If feasible, patients may be transported daily to the open air and fixation in the abducted attitude even permits locomotion without injury, as has often been demonstrated by young and unruly subjects. The spica is retained for from eight to twelve weeks, or until it may be assumed that union is sufficiently firm to permit movement of the limb. On

its removal, the patient should remain in bed, devoting if possible several weeks to muscular re-education and to the restoration of motion, in the disused joints, the limb being drawn out to the limit of abduction at regular intervals by the attendant.

Weight bearing is not permitted until free and painless movement and X-Ray examination indicate stability of repair. Thus what may be termed the physiological treatment of fracture of the neck of the femur of the ordinary type is rarely completed within a year, and if early locomotion is desired, a protective hip brace should be provided.

It may be noted that the abduction treatment applying surgical principles is conducted with a definite purpose, whose initial attainment may be demonstrated by X-Ray examination at the time of the operation and at intervals thereafter, and that from beginning to end the patient is under single control.

Because of the changes of posture that it permits, it has, as has been stated, a wide range of adaptability as regards age, while from the practical standpoint, it has an even stronger claim.

There is at present no adequate provision for these patients in hospitals, consequently the great majority must be treated at their homes. Under these conditions, the advantages of the abduction treatment are decisive, since if properly applied, it requires only supervision, supplemented by the quality of nursing usually at command. Conventional treatment on the other hand, if conducted with a pretense of surgical efficiency requires constant and skilled attention, much of which is expended on the prevention and care of bed sores.

In other words, fracture of the neck of the femur in the great majority of cases may now be treated like other fractures in entire disregard of the qualifications and conclusions of conventional teaching—and relatively speaking with the same prospect of success. This proposition has been supported not only by my own experience but by that of many others. The latest evidence on the point is presented by one of our own members in a report on 70 cases treated by the abduction method, (W. C. Campbell, Annals of Surgery, Nov. 1919) the majority of the patients being over 60 years of age. Seven of these were too recent to report. One could not be traced and there were five deaths (7%). Twenty-eight of the fractures were intra-capsular (central). Of these

twenty-four recovered with bony union and good function (89.2%). Similar results were attained in all the cases of the extra capsular type a total of 94.9%. "In the majority of cases a slight limp persisted but quite a number walk perfectly."

These statistics compared with those of the British Committee on fractures show a balance of 70% in favor of the abduction treatment.

The progress of reform has been slow, not because of active opposition but because of the apathy and indifference of the profession to a neglected injury. For this the teaching still following the old tradition is directly responsible since it presents no standard to which the advocate of efficiency may appeal, no incentive to energy nor penalty for incompetence.

It may be of interest to note in this connection that Sir Astley Cooper classed the neck of the femur with the patella and olecranon as bones, which when broken, united by ligament, primarily because contact of the fragments could not be maintained. He thought it important to establish this fact otherwise a disabled patient might think himself entitled to legal redress.

Now that the means are at command to appose and to maintain contact of the fragments, this suggestion is entitled to serious consideration, for the Surgeon may now be held responsible, if not for success, at least for the opportunity, which if lacking, determines failure.

THE CAUSES OF SUCCESS AND FAILURE IN TENDON TRANSPLANTATION

BY NAUGHTON DUNN, BIRMINGHAM, ENGLAND

Read by Title at the Meeting of the American Orthopedic Association, Toronto, June 1920.

Mr. President, Ladies and Gentlemen:

I would first wish to express to you my very sincere appreciation of your invitation to read a paper before the American Orthopaedic Association.

The subject I have chosen for my contribution is one on which I think we have all much to learn.

The degree of deformity following paralysis usually bears a direct relation to the loss of muscular balance. Where paralysis is complete there is usually little deformity beyond that resulting from the action of gravity. This in the case of the lower limb may be aggravated by the strain of the ligaments in supporting body weight.

Extreme deformities are always associated with unequal muscular control—the limb being drawn towards the stronger muscles. These shorten, the joints become distorted and much disability and deformity result from misdirection of the power which is present.

The aim of the Orthopaedic surgeon is to restore muscular balance.

Tendon transplantation should result in improvement of function both by weakening a group of muscles associated with the production of the deformity and by replacing or reinforcing the action of one which is lost.

Many of the tendon transplantations proposed and practised fulfill only one of these objects. They are apparent successes in that they have lessened the tendency to deformity, but although their new insertion is soundly established the patient is unable to direct them to their new line of action.

We are I think agreed that for successful tendon transplantation, after preliminary correction of the deformity, a certain technique in the operation is essential. The transplanted tendons

should run a direct course to their new insertion, they should be sutured under moderate tension, and they should not be subjected to strain until their union with the receiving tendon or bone is assured. Perfect asepsis is also necessary.

On looking back on a fairly considerable experience of tendon transplantation, I am convinced that success or failure has depended mainly on another factor—the possibility of re-education of the transplanted tendon to perform its new function.

The constancy of success in certain operations and the equal certainty of failure in others, has satisfied me that something more than the mechanical possibility of the operation is essential. My experience has been that where a single tendon has been taken to replace one of its own group, success has been the rule, but where a single tendon has been used to replace one not normally in action with it, failure has resulted.

I would therefore suggest that two axioms in tendon transplantation should be: (1) That a single tendon or part of a tendon should only be used to replace one of its own group i. e. one normally in action with it. (2) That a group of muscles but not an individual member of the group may be used to replace muscles not normally in action with it.

I do not assert that an individual tendon cannot be trained to functionate in a group with which it is not normally in action, but, for this, very special attention to re-education, and the active co-operation of an intelligent patient are necessary.

These desiderata are not always possible, so that the surgeon will usually prefer an operation in which they are not essential.

The re-education of an individual tendon to act apart from its group would appear to be more practicable in the upper extremity where the action of the individual muscles is more specialised.

The movements employed in locomotion are, however, simple and controlled by groups of muscles, so that it is more difficult to re-educate an individual muscle to act apart from the group with which it is normally in action.

We therefore find that in the lower extremity the limitations of successful tendon transplantation are more clearly defined.

Where there has been paralysis of the quadriceps, transplantation of the biceps has not in my experience resulted in voluntary

control of the movement of extension—whereas implantation of an active sartorius into the quadriceps and patella has always resulted in improvement in function. The sartorius in these cases is normally in action in the attempt to extend the knee in walking and by transplantation only becomes more effective.

When we come to deformities of the foot following paralysis of one or more muscles, the evidence in favour of the axioms I have formulated is more striking.

There are here for practical purposes only two groups of muscle—one group the anterior tibial in action in dorsiflexion of the foot—the other the peroneal and posterior tibial muscles associated in action in plantar flexion.

We find that any of the anterior tibial muscles may successfully replace one another e. g. the tibialis anticus to the outer side of the foot or the peroneus tertius to replace the tibialis anticus. On the other hand no muscle transplanted from the peroneal or posterior tibial groups will be effective in replacing the loss of dorsiflexion.

In my experience the most consistent failure in tendon transplantation has been that of using the peroneus longus or brevis to replace a paralysed tibialis anticus. We did not realise that these were muscles normally in relaxation when the dorsiflexors of the foot are in action.

I have lately in several cases transplanted both the peroneus longus and brevis muscles for complete paralysis of the anterior tibial muscles in the hope that it may be possible to re-educate both to act apart from the posterior tibial muscles with which they are normally more closely associated in action. The present stage of the results of these do not yet warrant a definite opinion.

In the case of the posterior tibial and peroneal muscles, these are, in practice, one group. All are in action in extension of the ankle, so that they may be used to replace one another with success.

In cases of calcaneus deformity of the foot the success of transplantation of all posterior tibial and peroneal muscles to replace a paralysed tendo achilles is a striking illustration of the principle we have adopted.

In the case of the upper extremity, the individual action of the muscles is more highly specialized, so that re-education of a

muscle to functionate apart from the group with which it is normally in action is more practicable. Even here, however, we find success more certain if we depend on one of the same group for the transplantation.

This is well illustrated in the case of simple paralysis of the short extensors of the thumb. If we utilise portions of the radial extensors of the wrist to replace them—recovery of function is natural, abduction of the thumb being a movement closely and commonly associated with dorsiflexion of the wrist.

Without careful re-education transplantation of the flexor carpi radialis for this purpose is not so likely to be effective.

There is in this case a tendency for the other palmar flexor of the wrist, the flexor carpi ulnaris, to come into action with it, so that extension of the thumb is associated with ulnar deviation of the hand in a position of palmar flexion.

Where there is loss of power of flexion of one or more fingers, we must depend on other members of the same group for their replacement.

The flexors of the wrist should not be used for this purpose, as they are normally in relaxation when the flexors of the fingers are in action.

Paralysis of the intrinsic muscles of the hand results in loss of power of normal flexion of the proximal phalanges in closing the hand. Sir Harold Stiles has had success by transplantation of slips of the flexor profundus digitorum to the proximal phalanges in these cases. This also is an operation which meets the axioms we have annunciated.

I would ask the members of this Association to reflect on their experience of tendon transplantation, so that if we agree on this question of the selection of tendons—a further stimulus may be given to this important branch of Orthopaedic Surgery.

AN OPERATION FOR THE RELIEF OF CONGENITAL EQUINO-VARUS DEFORMITY

BY FRANK ROBERTS OBER, M. D., 234 MARLBORO ST., BOSTON, MASS.

A brief preliminary report of the operation to be described below was published in August 1915[1], and since that time sixty of these operations have been performed at the Boston Children's Hospital by several members of the staff.

The operation is based on the pathological anatomy of the structures chiefly concerned in holding the foot in a position of equino varus. It is not employed in children under two years of age as it is very difficult to remove the periosteal-ligamentous flap from the tibia and calcaneus owing to the fact that their bones are almost wholly cartilaginous in structure and consequently are easily injured in attempts to denude them of periosteum and ligaments.

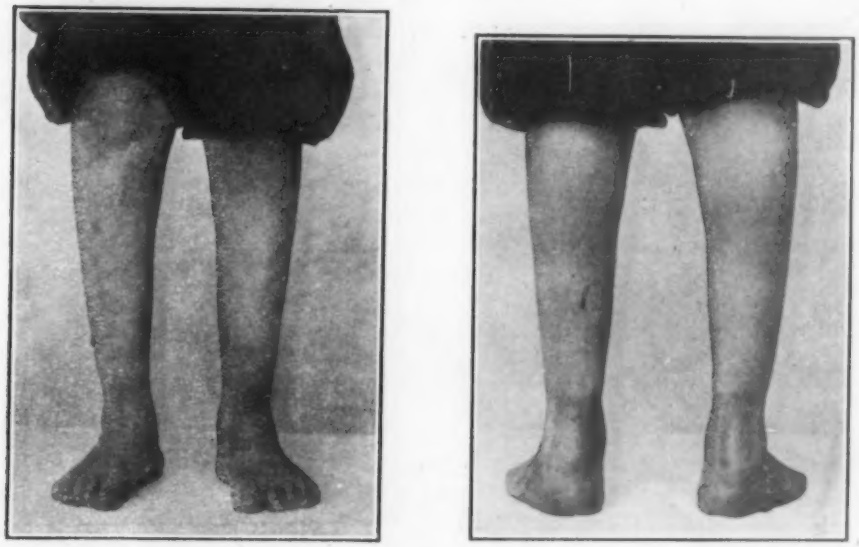
Pathological Anatomy

The pathology of a club foot begins at the knee and involves more or less the whole anatomy of the lower leg and foot. There is an outward torsion of the tibia, backward displacement of the external malleolus, shortening of all the tissues on the medial aspect of the foot and inner half of the plantar surface with a relative lengthening of all the structures on the lateral aspect, spreading of the fore foot, incurvation of metatarsal bones, adduction of the toes, and in those patients who have walked there are callosities and bursae in the region of the cuboid. The articular facets on the calcaneus and the astragalus are more or less altered depending upon the age of the patient and the severity of the condition.

Grossly, the deformity presents on inspection three distinct and separate elements viz: Plantar Flexion, Adduction and Inversion; these positions are maintained by contractures of tendons, ligaments and fascia in the dorsal, medial and plantar regions of the foot. In 1884[2], Parker and Shattuck published an article describing their post mortem observations on five cases of congenital equino varus in which they state that, after removal of all tendons the deformity still persisted and was not relieved until the deltoid ligament had been divided.

For clearness in description the pathology of each element will be taken up separately as follows:

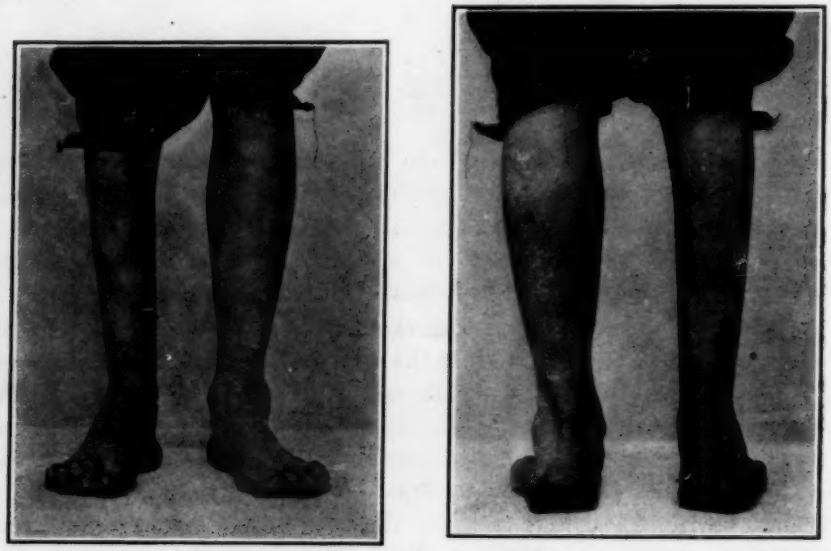
Plantar Flexion: The calcaneus is drawn up posteriorly and the astragalus is subluxed forward and often to such an extent that the posterior articular surface of the lower extremity of the tibia is in contact with the calcaneus. This position is maintained by contractures of the tendo Achilles and the posterior tarsal ligaments. As a result of a long continuance of this position it is difficult to force the astragalus back into the mortise formed by the



E. M.—Operation at eight years. Right foot operated March 15, 1915. Four previous operations, left foot having been corrected. February, 1920, thirteen years. Over corrects foot voluntarily, walks without a limp.

malleoli because the astragalus is shaped like a wedge both laterally and vertically, the thick portion being anterior to the mortise. Consequently the articular facets on the malleoli become adapted to the thin end of the wedge thus increasing the difficulty of overcoming equinus. From observations at the time of operating on some of the older children it has been found that the anterior tarsal ligament has adhered to the superior articular surface of the astragalus and unless freed this also becomes a factor of resistance to correction of the equinus.

Adduction: The scaphoid is subluxed inward and articulates with the medial aspect of the head of the astragalus and may in severe cases articulate with the anterior aspect of the internal malleolus. As a result of this position the head of the astragalus is deflected laterally and tends to become pointed or V shaped. The cuboid is also subluxed inward and articulates with the medial aspect of the anterior articular surface of the calcaneus. The anterior articular surface of the calcaneus also becomes pointed or V shaped.



J. M.—Operation at ten years. Right foot operated June 10, 1915. February, 1920, fifteen years. Voluntary dorsal flexion without adducting, has a few degrees of active motion in abduction and adduction, 20 degrees in flexion, walks toeing out without a limp.

The above alterations of normal articular facets offer considerable resistance to the correction of the adduction. The position of adduction is maintained by contractures of the anterior and posterior tibial tendons, the inner half of the plantar fascia, the longitudinal fibres of the deltoid, the inferior calcaneo-scaphoid and the astragalo-scaphoid ligaments.

Inversion: The calcaneus is subluxed or rotated inward beneath the astragalus on its long axis and carries the fore foot with it. It is slightly curved laterally and in the severe cases the sus-

tentaculum tali may articulate with the internal malleolus. This position of inward rotation is maintained by contractures of the tibial tendons and the vertical fibres of the deltoid ligament.

Phelps, in 1891[1] found after ten years of experience "that the os calcis was inwardly rotated and for this he devised a powerful osteoclast to correct the powerful ligamentous contracture as it could not be done by hand." This element of the club foot deformity often persists after forcible manipulations and tenotomies and is probably the first of all to recur. It is impossible to correct it in osteotomy of the calcaneus unless the sustentaculum tali has been severed from the body.

The Operation

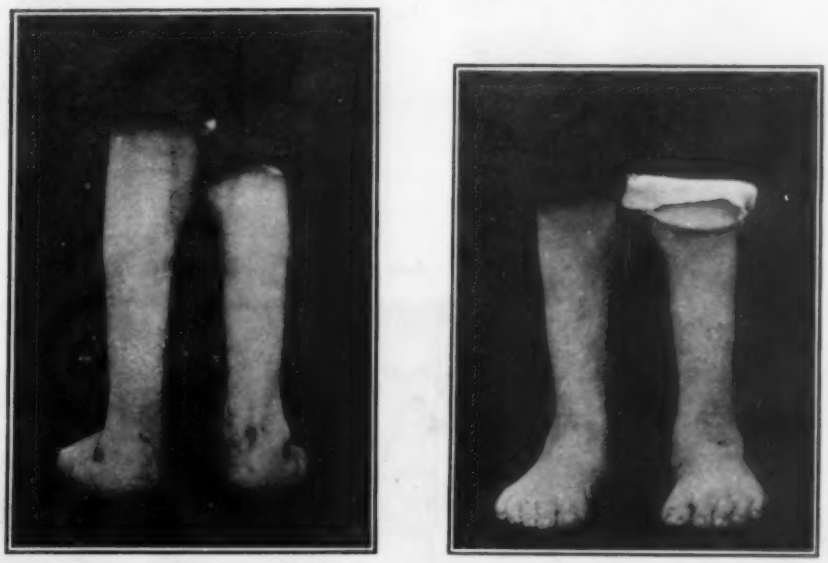
A curved incision is made over the medial aspect of the ankle joint, beginning two inches above the malleolus and half way between the border of the tibia and the tendo Achilles, carried downward, curving forward below the internal malleolus and then upward ending over the internal cuneiform.

The incision includes the tissues down to the deep fascia. The flap thus formed is cleared from the lower end of the tibia. A second incision is next made beginning at the posterior tibial groove one-half to three-quarters of an inch above the internal malleolus extending forward across the medial surface of the tibia curving downward and ending at the inferior border of the scaphoid. This incision is made through the deep fascia, periosteum annular ligament and anterior portion of the deltoid ligament exposing the ankle joint. The deep fascia and periosteum are denuded from the bone and in the flap is included that portion of the deltoid ligament which is attached to the internal malleolus and the internal aspect of the astragalus. On retracting the flap the tip of the sustentaculum appears in the wound and from this is removed the ligaments and periosteum, the dissection being carried well down on the internal surface of the calcaneus so that the whole attachment of the ligaments is removed from it subperiosteally. In older children it will be found necessary to lengthen the posterior tibial tendon.

The next step is the subperiosteal removal of the astragalo navicular ligament from the scaphoid and clearing the superior

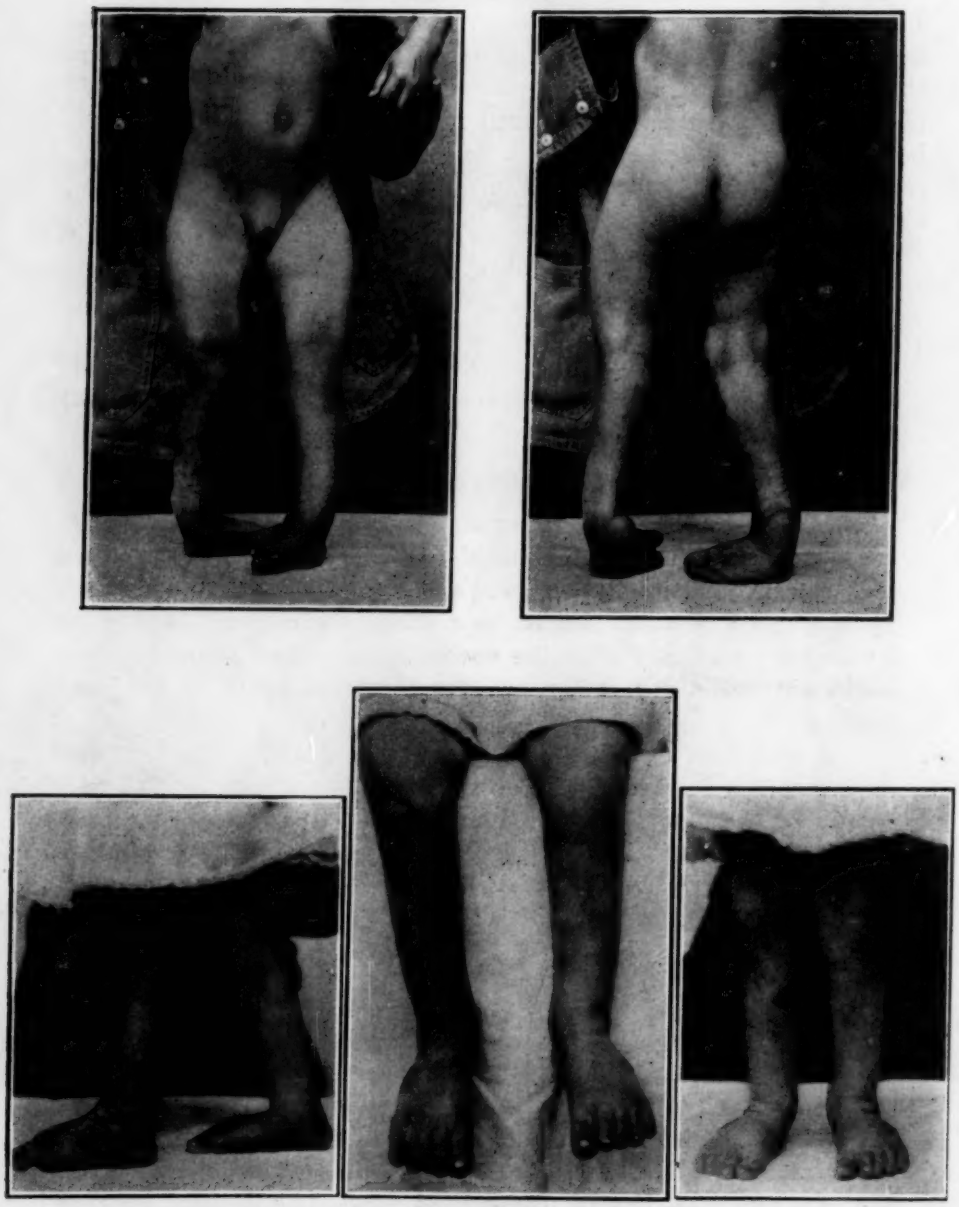
J. C.—Operation at four years. Left foot operated June 16, 1915. February, 1920, eight years, walks with both feet straight without a limp, arch low, voluntary dorsal flexion with the foot slightly abducted.

surface of the astragalus of the anterior tarsal ligament if it be adherent. The plantar fascia is divided subcutaneously. The adduction is over corrected by manipulation over a wedge and after this has been done forcible manipulation of the inversion and plantar flexion is performed until moderate over correction has been secured; the tendo Achilles is next divided subcutaneously and the manipulation continued until the foot can be held in a position of desired over correction of the whole deformity by one finger. The reason for leaving division of the tendo Achilles until the end is, that it seems to aid in the early part of the correction making it less difficult to drive the astragalus back into the mortise. The periosteal-ligamentous flap is sutured with one inter-



J. M. Operation both feet May 10, 1919. Recurrence after previous operation March 25, 1918. March 1920, arches flat each calcaneus everted, over corrects voluntarily, adduction of the phalanges.

rupted chromic catgut stitch to the anterior portion of the deltoid ligament in such a way as to leave a good margin of its tip in contact with the lower end of the malleolus. The subcutaneous fat and fascia are united by interrupted chromic catgut sutures. The skin is closed with No. 12 interrupted silk. This is used because other suture material will not stand the tension of approximation when the foot is held in an over corrected position.



T. D. Five years. Operation October 27, 1919 both feet, plaster worn until February 18, 1920. March 24, extreme over correction, both passive and active. Never had any previous treatment.

Post Operative Treatment

The foot is put up in plaster reaching from the toes to the mid thigh with the knee flexed and in a position of only slight over correction, because full over correction impedes the circulation to a serious degree. This is probably due to stretching and flattening of the posterior tibial vessels. Fourteen days after the operation the stitches are removed and the plaster changed but at this time the amount of over correction can be greatly increased without interfering with the blood supply. If the position be unsatisfactory the plaster may be renewed at monthly intervals until the desired amount of over correction is obtained.

The foot should be kept in plaster for four or five months and then some form of club foot brace should be worn night and day for six or eight months longer.

General Considerations

One of the chief characteristics of congenital equino varus, without regard to what method of treatment has been pursued, is an inherent tendency to recur and a relapse after removal of cuneiform wedges amounts almost to a surgical disaster. A few relapses have occurred after the operation described above has been performed but the foot can be over corrected again by the same method.

A club foot should never be considered as having too much over correction and any early desire to relax in after care will practically always result in a recurrence.

A cure is not complete until every element in the deformity is over corrected and the patient is able voluntarily to put his foot in a position of over correction.

Summary

1. The operation lengthens the foot.
2. Any desirable amount of over correction may be obtained.
3. No important vessels and nerves are injured.
4. The removal of the contractures allows one to obtain an anatomical reposition of displaced bones.

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SOME FACTS ON SCOLIOSIS

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In the June number of this Journal under the caption "Special Article," with a title "The Surgical Treatment of Scoliosis" appear some statements which are apparently so misleading that the proper treatment of the deformity is obscured and a brief presentation of facts which their author has failed to recognize seems necessary. In order that some of the views held by the author of the above mentioned article may be noted without reference they are here quoted verbatim and answers made to them.

"The thorax moves as a whole."

"No vertebra or no rib moves singly."

"The thorax moves as a whole and each component part has its own part to play during any movement of the thorax."

The thorax does not necessarily move as a whole since a small section of the spine with the attached ribs may be moved without affecting the remainder, or one section may move in a certain direction and the rest move in an opposite direction. It is only in severe cases of arthritis of the spine in which ankylosis of the joints is complete that the thorax must move as a whole. The spine —a flexible body—and its appendages are so constructed anatomically that sections of the thorax may move or be moved without materially affecting the rest. If this be not so, how can a pathological scoliosis exist in one section of the thorax and the rest remain in a normal position?

No better illustration of the movableness of one part of the thorax by applied force, can be shown than in the accompanying illustrations, which are used simply to prove not only that one vertebra can be moved upon another but that it can be moved easily and harmlessly. (Figs. 1 and 2.)

Fig. 1 is an exact tracing of the skiagraph in a mild case of pathological scoliosis before reduction of the deformity. Fig. 2 is a tracing of a skiagraph of the same spine immediately after the first plaster corset was applied.

Note the position of the eighth vertebra which has been partially dislocated by pressure on the wrong ribs. The force used

in this case was so little that the patient did not complain of any discomfort whatever; was up around playing with the other children immediately after the corset was finished; and there were no pressure symptoms whatever.

In a normal spine it is possible even by very slight pressure to push one or several vertebrae out of normal relationship with the others.

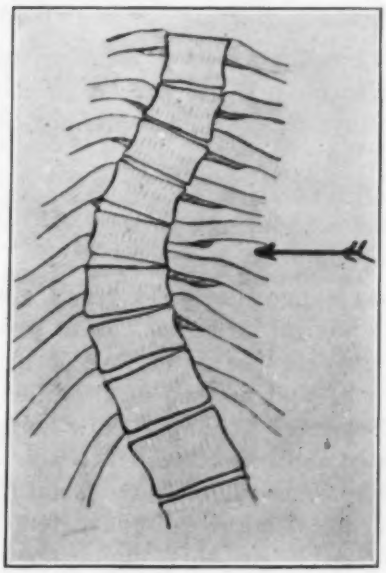

FIG. 1.

Skiagraph of a case of left scoliosis, before corset was applied.

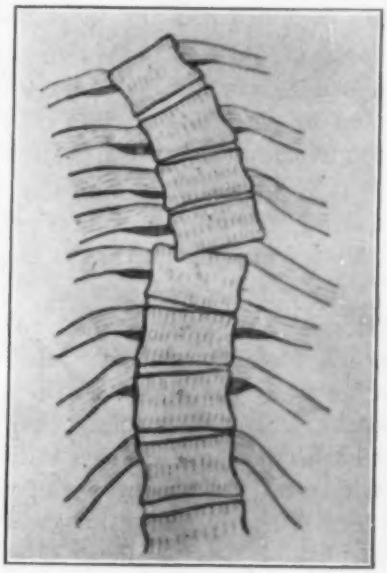

FIG. 2.

Skiagraph of same case as Fig. 1. Result of pressure wrongly applied. The pull was made against only two ribs instead of being distributed. This amount of displacement of the body of the eighth vertebra caused no symptoms whatever.

He also states that, "Physiological movements of the thorax are intricate." "Physiological scoliosis is a complex condition." "Pathological scoliosis is equally complex, * * * *." "For these reasons the correction of a pathological scoliosis is difficult."

The physiological movements of the thorax are not intricate when once understood, and physiological scoliosis is not a complex condition, but one of the normal physiological positions of the body

assumed at will frequently and necessarily many times daily during the ordinary activities of routine life.

It is simply the position of flexion plus lateral bending, plus rotation of the bodies of those vertebrae included in the curve towards the convexity of the lateral bend. It is the very frequent position assumed by the student, who sits obliquely at a desk writing.

Pathological scoliosis is no more complex than physiological scoliosis, since it is the same position.

On account of these two facts the reduction of a pathological scoliosis is not difficult unless the deformity is so extreme or affected by disease that like other deformities the parts cannot be brought completely to a normal position.

It is not the reduction that is difficult but the thorough understanding of the fundamental principles which make it possible and without which correction is absolutely impossible.

He further states that, "It was suggested some years ago that the rational treatment for pathological scoliosis was to produce a physiological scoliosis of a reverse character, but it has been rightly contended by the author of that method of treatment that vertebrae which have been pathologically changed, now being wedge-shaped, are carried individually and collectively into a new position by the production of this physiological scoliosis forming, indeed, an area of pathological scoliosis of a reverse character to the physiological scoliosis now produced." If this quotation be correctly interpreted by the writer of this article the author means that the original deformity is carried in toto, and unchanged to the other side of the median line.

It is true that the above suggestion was made by him some years ago, and he accompanied that suggestion by another which was, that, by pulling the spine to one side and twisting one end of it, a physiological scoliosis was created.

With the investigations which have been made in recent years in scoliosis and the light which has been thrown on the subject by them, certainly no one could entertain the latter suggestion, since the conception is so different from what is now known to be correct that it appears absurd.

The statement in the beginning of his first suggestion "that the rational treatment for pathological scoliosis was to produce

a physiological scoliosis of a reverse character" is correct. This is a fundamental principle which governs the correction of all similar deformities, a principle recognized so long ago that there seems to be no author, and he should not imply that he discovered it, and what is of still greater importance, he should not indicate that he even approached the discovery of that physiological scoliotic posture or a method of producing it. As already stated the posture which he produced in his attempt to establish this long known fundamental principle in the treatment of scoliosis and allied deformities had very little, if any, resemblance to the true physiological posture of scoliosis and therefore, the method of reduction advocated by him does not and cannot produce results. In such a procedure most certainly the thorax moves as a whole and the deformed vertebrae" are carried individually and collectively into a new position by this physiological scoliosis forming, indeed, an area of pathological scoliosis of a reverse character to the physiological scoliosis now produced." Nothing else could be expected from such an understanding of the position of physiological scoliosis. Simply bending the spine and twisting one end of it does not produce a scoliosis of any kind.

Certainly the statement that "we cannot cure the greater by the less" is well made since it is impossible to produce the physiological posture in this way let alone correcting the deformity. In other words, no one could cure any deformity of the spine in this way; in fact, one could scarcely partially correct it by following such principles.

Proof that vertebrae and ribs are reversed in their positions when carried into the opposed scoliotic posture in the reduction of the deformity is positive.

An illustration of this is shown in Figs. 3 and 4.

Fig. 3 shows tracings of a skiagraph in a pathological scoliosis, and the arrow points to a wedge-shaped vertebra.

Fig. 4 shows a tracing of a skiagraph of the same spine in over-correction, and the arrow here points to the same wedge-shaped vertebra in its reversed position.

The facts stated here relative to Figs. 1, 2, 3 and 4 are so easily proved that anyone having the inclination to search out the truth may readily possess the knowledge by his own work, if so minded.

It is true "that in certain methods of treatment forces which are applied to produce beneficial results in one place may produce the reverse in another,'" but it is equally true, if the proper method is used, that such does not occur, and it is failure to understand the correct fundamental principles in the reduction of the deformity that has caused so much adverse comment.

No one would want to deny, or attempt to do so, "that there are patients afflicted with scoliosis, of such a degree, that no form of treatment yet devised can be depended upon to relieve their de-

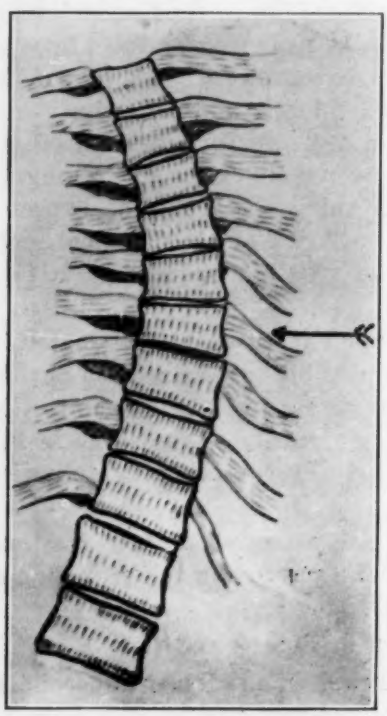

FIG. 3.

Skiagraph of a case of scoliosis, before corset was applied.

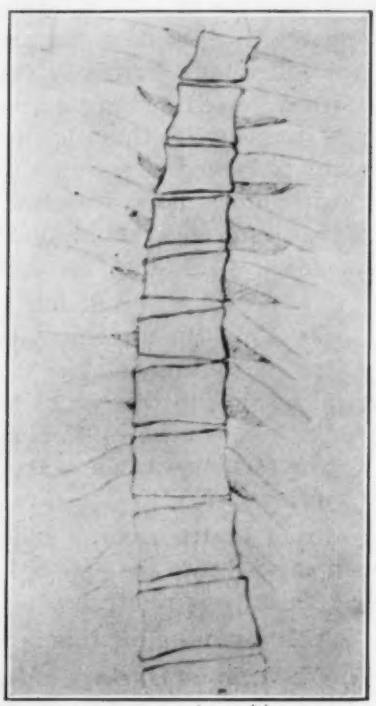

FIG. 4.

Skiagraph of same case as Fig. 3, after over-correction. Complete over-correction of both rotation and lateral bending. The deformity does not swing to the over-corrected position in toto, but each vertebra has reversed its original position held in the previous deformity.

formities." Any method has its limitations just the same as any method for the correction of other deformities has.

It is also true that in these cases i. e., those where the deformity is so great or affected by disease that complete reduction is impossible, we must content ourselves with doing what we can for them, but it might be said with equal truth that if the proper method of reduction was in general use instead of the many varieties of old methods, which are of little, if any value, there would be so few of the impossible ones that the operative end of the treatment would require little if any attention, except in cases of paralysis.

No exceptions are taken to the remarks made on the value of an operation in hopeless cases of the deformity, as unquestionably such a procedure is indicated, but in his final paragraph where he, the author, states "in conclusion the writer should say again that he does not believe that any method has been devised for the rapid and complete reduction of pathological scoliosis," it may be said in passing, that he apparently does not recognize pathological scoliosis except in its hopeless stages, or else he is in the same position as the general practitioner who has never seen any results from the use of antitoxine in diphtheria.

Editorial

The editor desires to call attention to the abstract in this number by Dr. Donnelly of an excellent recent article by Dr. Dean Lewis on "The Principles of Peripheral Nerve Surgery" (Journal A. M. A., July 10, 1920).

Since the publication of the important book by Tinel, careful articles on peripheral nerve injuries and their repair have been written by Platt, Cone, Adson, Danforth, and many others. Much excellent work was done by Sir Harold Stiles of Edinburg, and others in the British Isles. As a result, we have been able to arrive at a number of very definite conclusions in regard to the indications for operation in peripheral nerve injuries and their results.

In general, these are about as summarized by Dr. Lewis. First, neurolysis, or release of an injured nerve from scar, gives a high percentage of excellent results. Second, early, accurate re-suture of divided nerves gives a considerable percentage of return of power in the affected area. Third, the farther one gets from these simple procedures, the less one's chances are for improvement. That is to say, more highly technical operations like nerve transference, cable transplants or even tubulization of reunited nerves, give disappointing results as a rule.

Dr. Lewis has very comprehensively and successfully laid down as the title of his article suggests, the principles which must govern the selection of cases and the technical procedures to be employed in practically all peripheral nerve injuries and operations.

Any conclusions regarding peripheral nerve surgery, however, from Dr. Lewis' article, must be tempered by the fact that Dr. Lewis has made no mention of the points brought out by Dr. Murray S. Danforth in his article in this Journal last year, regarding the preparation of patients and their extremities for nerve operations.

It is of the greatest importance that existing deformities be corrected and that as nearly a normal range of motion as possible

be secured for entire affected extremities. This applies to the period both before and after any operations of this sort. These operations and the various associated tendon plastic procedures demand careful consideration of measures for the restoration of position and establishment of full range of motion. These are absolutely essential or the most skillful surgical procedures will be of no avail.

News Notes

The Interallied Conference on the care of the war crippled was held this year in Brussels September 19 to 24.

The fifth congress of the International Society of Surgery was held in Paris July 19-23. Dr. W. W. Keen presided. Dr. Depage was one of the prominent members. Sir William Macewen was elected president and the next meeting will be held in England in 1923. Arthroplasty is one of the subjects assigned for the next meeting.

Colonel F. F. Russell has resigned from the Medical Corps, U. S. Army. He will assume charge of the Division of Public Health Laboratories of the International Health Board of the Rockefeller Foundation.

Dr. Joseph Spellissy of Philadelphia and Mrs. Spellissy were seriously injured in an automobile accident on September 2. The car in which they were driving was struck by the Philadelphia-Long Branch Express. Mrs. Spellissy is dead. Dr. Spellissy is at the Ann May Memorial Hospital at Spring Lake Beach, with the result of his injuries still in doubt, at the time this note is written.

Dr. Spellissy has done much good work in the American Orthopedic Association.

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Current Orthopaedic Literature

PRINCIPLES OF PERIPHERAL NERVE SURGERY. By Dean Lewis, M. D. Chicago. *Jour. A. M. A.*, Vol. 75, No. 2, July 10, 1920.

When a nerve is divided, definite evidences of regeneration are noted within a few hours in the proximal segment adjacent to the point of injury. Some of these early changes are abortive, but others indicate attempts at repair. Some degenerative changes occur in the neuraxes in the distal end of the proximal segment. These do not extend far back in the nerve, probably only to the next node of Ranvier.

Definite regeneration of neuraxes occurs only in the proximal segment, and all the neuraxes that eventually neurotize the distal segment passing into the motor end plates and sensory endings develop from those of the proximal segment. By the eighth day after division of a nerve, the medullated fibers of the proximal segment have given off numerous lateral rami, some 5 mm. above the point of section. These grow distad beneath the old neurilemmal sheath. The non-medullated fibers also dissociate into bundles of neurofibrillae which grow down in the old sheath by the fourteenth day. In studying the repair of nerves thru a gap, it can be positively demonstrated that no neurofibrillae can be found in the distal segment until those developing from the proximal segment have bridged the gap.

The changes that occur in distal segment after division are equally important to those occurring in the proximal. Nerve impulses cannot be transmitted without neuraxes, but the neuraxes cannot reach their terminal distribution unless bands of conduits are formed along which these can pass or creep, both degenerative and regenerative changes occur in the distal segment after division. The neuraxes soon become broken up. Often they seem to have snapped. Later they break up into fine granules. The myelin breaks up into balls and globules. While these degenerative changes are occurring, in the neuraxes and myelin sheaths, definite evidences of growth or repair are noted in the sheath cells. The adult neurilemmal sheath (Schwann) is a fine, thin, structureless membrane provided with fusiform nuclei—one to each node of Ranvier, the latter varying from 80 to 900 microns in length.

After division, the sheath cells of both the proximal and distal segments bordering on the traumatized area react early. The first indication of a growth change is indicated by a slight increase in the granular cytoplasm surrounding the nuclei of the sheath cells. This change is observed within 24 to 36 hours after division in the cells immediately adjacent to the zone of injury. The cytoplasm increases rapidly in amount, the nuclei undergo mitosis and by the fourth to the sixth day definite protoplasmic bands have formed. These are narrow strands or bands of protoplasm with hyperchromatic nuclei. This growth change, leading to the formation of protoplasmic bands, occurs throughout the distal segment. Certain factors, probably traumatic, greatly accelerate the process in those sheaths bordering on the line of division. The fully formed

protoplasmic bands appear later in the peripheral parts of the distal segment than in those adjacent to the line of division.

These evidently play an important role in nerve regeneration; for the fibers which have no neurilemmal sheaths, such as those of the optic nerve and spinal cord, do not regenerate after division. Kirk and Lewis, in studying regeneration of peripheral nerves after fascial tubulization, could demonstrate these bands passing through and bridging the gap. They seemed to precede the developing neuraxes forming a pathway for these as they developed. The neuraxes—the conducting portion of the nerve fiber—develop only from the proximal segment after division of a nerve. The changes in the neurilemmal sheath which occur throughout the distal segment and in the distal part of the proximal segment adjacent to the line of division—the so-called wallerian degeneration—are essential to the definitive regeneration of the nerve.

In the repair of a divided nerve, the first consideration is to provide easy access for the developing neuraxes to the distal segment. After division of a nerve, a neuroma will develop within nineteen days. Even when there has been no hemorrhage or infection, a neuroma develops. The cut fibers retract within the epineural sheath and a connective tissue cap forms over the end of the nerve. There is a very marked attempt at repair, for the developing neuraxes, as they reach the connective tissue, formed by the cells of the endoneurium and perineurim and surrounding tissues, turn back on themselves to form the spirals described by Perroncito. The neuromas which invariably form after division of a nerve are indicative of an attempt at repair which has been thwarted by scar tissue. Some of the developing neuraxes may zigzag through scar tissue and reach the distal segment, but it is doubtful whether they will reach the terminal connections to which they were originally destined.

Scar tissue forming after division of a nerve interferes seriously with nerve repair. There has been a tendency of late to advise suture by neuroma. There will be few successes when such a procedure is attempted. In all cases the neuroma should be resected until healthy funiculi appear and to the point where scar tissue is not visible to the naked eye. In many instances even after the neuroma has been resected far back, the funiculi will have a peculiar matted, gelatinous appearance. This appearance is due to small amounts of young connective tissue, developing neuraxes and some edema. The results which have been obtained after suture would seem to indicate that successful nerve repair may be obtained when end-to-end suture is made between funiculi having this appearance.

It is advisable in many cases to employ frozen sections to determine the level to which the resection of the neuroma should be carried.

Success in peripheral nerve repair depends on accurate anatomic approximation of the two ends. The importance of the internal topography of the peripheral nerves should be emphasized. Stoffel has insisted that the funiculi in a mixed nerve have a fairly definite position and that the sensory and motor funiculi, which serve different muscles, maintain their position and relation throughout the entire course of the nerve, for Langley has demonstrated in peripheral nerves an internal plexus. The internal plexuses apparently serve to collect together the afferent and efferent fibers of the different nerve roots for the areas supplied by the peripheral nerves, just as the brachial and lum-

bosacral plexuses do for the large areas supplied by the nerve trunks. In the region between the origin of two successive nerves, not arising close together, the bundles are arranged in groups which have little or no connection with one another although the bundles forming the group are more or less interconnected. Such a region is called an intermediate region, but gradually blends with the region in which is found the plexus which is formed by the interlacing of fibers or bundles given off from the nerves or bundles of the intermediate zone. Langley's work agrees with that of Dustin, who described an interlacing of nerves or bundles between the funiculi or peripheral nerves at points where branches are given off.

As far as the surgery of peripheral nerves is concerned, Stoffel's and Langley's work, although differing in detail, emphasizes the importance of nonaxial rotation of nerve trunks during suture, thus avoiding distortion of the nerve pattern.

The funicular suture is the object to be desired, but the author believes it impossible. As perfect anatomic repair as is possible should be secured in order to preserve the nerve pattern. The surgeon who makes the most perfect anatomic repair will, other things being equal, have the greatest number of successes.

It is often difficult to determine whether or not rotation has occurred or the amount of rotation, if such has occurred. This is especially true when the nerve has been divided by a missile, for the nerve after division may be rotated by the force continuing to act. When the nerve is exposed, fine silk sutures may be inserted on both sides of the nerve before it is lifted from its bed. These serve as guides to determine the exact position of the nerve segment when suture is attempted. Mosquito forceps may be used for the same purpose, but they are not so easy to handle and may cause more injury to the nerve.

If after suture, fibers originally destined for a certain group of muscles become partly distributed to their own group and partly to another group, marked inco-ordination of movements may occur. The movements are then no longer precise. They are awkward and without force. This is often seen after suture of the radial nerve, when the supinator longus contracts more forcibly when attempts are made to use the extensors of the wrist than when the forearm is flexed on the arm.

The length of time intervening between the division of the nerve and repair is the third important factor in determining the success of nerve suture. Those cases in which nerve suture is performed early, in which the period between the injury and the operation does not exceed three or three and one-half months, have a higher percentage of recoveries than those in which the suture is performed later. The importance of the time element cannot be emphasized too strongly, for there is a tendency in civil practice to delay operation in hopes that improvement may occur if massage, electricity, etc., are continued long and faithfully. Supplementary movements; movements which are not dependent on regeneration of the injured nerve are often regarded as evidences of recovery. These movements should be carefully studied, for operative interference should not be delayed because of the mistake of interpret-

ing these movements as evidence of return of function in the paralyzed group of muscles.

End-to-end suture is the only procedure that can be relied upon to re-establish the continuity and function of a nerve after division. It makes no difference concerning the suture material, for fine silk or catgut gives equally favorable results. Transfixion sutures do not seem to disturb the nerve pattern, but epineural sutures are most satisfactory. In cases where some traction must be exerted, it may be necessary to employ one or more transfixion sutures.

The sutures should be applied so that the epineurium is closed, thus preventing straying of neurofibrillae into surrounding tissues. The ends should be approximated without pressure. It has been advised that a small gap be left. The author believes this poor advice, although one can see the reason for it after examining neuromas which have been removed when the suture was performed.

Mobilization of the segments will often permit of end-to-end approximation even when the defect is long, especially when combined with displacement of the nerves and change in the position of the parts. Dissection of a nerve from its bed apparently does not interfere with regeneration, for recovery within the time expected after suture occurs when, for example, the sciatic is dissected out of its bed for considerable distance. In the cases in which the defect is so long that end-to-end suture is impossible, many procedures have been suggested. Cable Transplants:—Experimentally, auto and homo-cable transplants will conduct neuraxes from the proximal to the distal segments. Fascial tubes can also be used with success experimentally.

The results obtained by Platt in clinical surgery when these procedures are employed are not encouraging. These suggest either that the results obtained experimentally cannot be applied directly to clinical surgery or that our technic is at fault in this work.

Platt's conclusions are as follows:

1. In 18 operations in which fascial tubulization combined with autogenous nerve grafts, fascial tubulization alone and autogenous vein tubulization (one case) were used, there was a complete absence of any clinical sign of recovery. The shortest period over which observations were made was four months, the longest period 26 months.

2. Secondary explorations in 4 cases showed complete silence of the nerve trunk to direct faradic stimulation. End-to-end suture was accomplished in all exsections of the bridged segment.

3. At the re-exploration operations, partial or complete obliteration of the lumen of the fascial tube was noted.

4. In two specimens examined histologically, a tubulization alone, showed obliteration of the lumen of the tube by fibrous tissue in which no nerve fibers could be found. In the second, a graft and tubulization combined, nerve fibers were present in the center of the obliterated tube 18 months after the operation. There was no sign of continuity between the proximal and distal ends through this strand of nerve fibers.

5. The early re-exploration of all graft and fascial bridge operations is advisable.

In 120 operations auto cable transplants were used 12 times and tubulization with fascia 6 times. In none of these has there been recovery, although in two transplantations there has been some slight return of motor power in isolated muscles. The striking thing is that the transplant may increase markedly in size. The author believes that these cases should be explored after a reasonable time as a block to the developing neuraxes may occur at the junction of the transplant and the distal segment. Resection and suture at this point might favor the downgrowth of neuraxes and neurotization of the distal segment.

The group of nerve injuries in which there is no anatomic division but a physiologic interruption of nerve impulse offers some interesting problems. The pathology varies considerably. Constricting bands, thickened epineurium, bony callus and thickened cicatricial nodules within the nerve resulting from intraneural hemorrhage and proliferation of intraneural connective tissues are the conditions most frequently found.

Not all are agreed as to the procedure to be followed. In some cases the indications are well defined. Tinel has stated that neurolysis is permissible only when it restores a free, supple nerve, in the interior is found no obstacle to regeneration and that as a whole liberation is ineffective in cases of severe lesion of nerve trunks associated with rupture of the sheath, and development of scar tissue with the formation of the neuroma. In these cases the cicatrical tissue is either permeable to regenerating axis cylinders, in which case intervention is useless, or the obstacle does not permit of the passage of axis cylinders, and an operation such as neurolysis will not make it permeable. Neurolysis is of distinct value, but it is sometimes difficult to determine whether or not the results are the direct results of surgical intervention. Many of the patients recover spontaneously. The value of the operation cannot be denied in those cases in which paralysis has existed for months and in which a distinct return of motor power occurs within 10 days following the operation. Nerves which present the least macroscopic change may have the greatest alteration in or suspension of function. This is especially observed in those cases in which a number of nerves, some of which have recovered spontaneously, have been affected. When the operation is performed it may be found that the nerves presenting the most marked pathologic changes are the ones that have recovered spontaneously.

Whether neurolysis or resection is to be performed depends upon the appearance and feel of the nerve and the electrical reaction. The time element is important in determining the results after neurolysis, that is, the time existing between the injury and the operation. There is no relation between the amount of improvement and the time at which it begins after this operation, for many of the patients who improve the most are those who begin to improve some time after operation.

A number of methods have been suggested to prevent the reformation of scar tissue after neurolysis. Whenever possible the liberated nerves should be placed between uninjured muscles. Even in large wounds with a great deal of scar tissue it is possible to displace muscles so that a new bed can be formed

for the liberated nerve. Liberated nerves should not be placed in contact with cut muscle fibers, for the adhesions which then form may seriously interfere with the conduction of the nerve impulses.

Cargile membrane is the next choice. Fascia cannot be used for this purpose to advantage. When placed in contact with scar tissue it becomes invaded by and converted into scar tissue. The author has reoperated upon three cases in which a free fat transplant had been used for neurolysis. The fat had disappeared from all, and in the place of the transplant were adhesions. These were delicate, but delicate adhesions frequently seriously interfere with nerve conduction.

Peripheral nerves have great regenerative power. The procedures that are necessary to the establishment of repair are plainly indicated by clinical and experimental studies and the histologic examination of specimens. Changes occurring in muscles and joints which develop during repair unless prevented or corrected will defeat the purpose of the operation. Careful and assiduous after-treatment is necessary. There should be the closest co-operation between the physiotherapist and the surgeon. Nerve injuries occurring in civil practice should be operated upon earlier than they are. Time is lost waiting for evidence of return of function. Secondary changes occurring in the nerve during this time may render the operation difficult, often unsatisfactory and the changes which occur in the muscles and joints may increase and prolong the disability.

Early exploration after nerve injuries with loss of function of the muscles supplied by the nerve affected is advisable, for the condition of the nerve can be determined and steps taken to promote an early return of function. Results in nerve surgery become progressively worse with delay.—*Leo C. Donnelly, Detroit.*

A Case of Membranous Syndactyly Associated with Brachydactyly. E. Kirmisson. *Revue d'Orthopedie*, April 1919.

Report of a case of membranous syndactyly between second and third and fourth and fifth fingers of the left hand. The peculiar feature was the accompanying smallness of the fingers which were up to 10 mm behind the corresponding fingers of the other hand.—*A. Steindler, Iowa City, Ia.*

Abnormal Type of Syndactyly. Nove-Josserand, *Revue d'Orthopedie*, April, 1919.

Description of a case of apparently complete fusion of third and fourth fingers, with single nail. The X-ray reveals that true skeletal fusion is present only in the end phalanges, middle and basal phalanges being entirely distinct. This type represents an intermediate stage between true fusion (Giant finger) and Acro-syndactyly.—*A. Steindler, Iowa City, Iowa.*

ECTROMELIA OF THE RIGHT UPPER EXTREMITY. A. Mouchet and R. Pilatte. *Revue d'Orthopedie*, March, 1920.

Case observed was that of a nineteen year old girl presenting the deformity of Ectromelia on the right upper extremity. Most of the paper is given over to a minute description of the deformity the details of which must be seen in the original article. The main anatomical features of the case are the absence of the elbow joint and the very incomplete scapulo-humeral articulation; the malformation of humerus and absence of ulna; the only bone of the forearm was the radius.—*A. Steindler, Iowa City, Iowa.*

SUPERNUMERARY AND BIFID THUMBS. A. Mouchet and F. Lumiere, *Revue d'Orthopedie*, March, 1920.

Two observations. In the first case a bifurcation within the end phalanx with duplication of the nail; in the other case, there was, on the left hand, a bifurcation of the thumb over the metacarpo-phalangeal joint, with cutaneous syndactyly, the web reaching to the base of the end phalanx with both nails completely separated; the other hand showed an appendiceal thumb branching off over the head of the metatarsal, both phalanges being fully developed, but smaller.

The author calls the deformity in the second case: polydactylie policienne. —*A. Steindler, Iowa City, Iowa.*

THE MECHANICAL TREATMENT OF COMPOUND FRACTURES OF THE UPPER EXTREMITY. James E. M. Thomson, A. B., M. D., Lincoln. *Nebr. State Med. Journal*, June, 1920.

The paper is limited to the mechanical treatment of compound fractures of the upper extremity with no reference to etiology, anatomical relations, or infectious processes complicating bone injuries except as they bear directly on the treatment of the particular fracture discussed.

According to definite principles of treatment he has the following classification:—

I Fractures of the humerus.
  1. (a) Fractures into the shoulder joint.
     (b) Fractures of the Surgical neck and upper third.
  2. (a) Fractures of the middle and lower third.
     (b) Fractures into the elbow joint.

II Fractures involving the bones of the forearm.
  (a) Fractures above the lower fourth of radius and ulna, one or both bones.
  (b) Fractures of lower end of one or both bones and into the wrist joint.

In discussing the mechanical treatment he takes up the importance of first aid treatment as soon as possible after the injury. By this the proper splinting and position of the part is maintained during transportation and until hospital management can be begun. First aid plays a definite part in the ease of after management and the character of the final result obtained.

The various positions are described according to the site of the fracture, it also being emphasized that merely fixation and no traction be made in fractures of the shoulder joint, while traction is employed in fractures of shaft of humerus. In case of fracture of the elbow joint flexion with slight or no extension is the position of election.

The cock-up or dorsiflexion position should be maintained in case of fracture of the lower ends of the radius or ulna when there is carpal complication. Hospital management should embody every feature to promote the best results. The various mechanical devices should be largely guided and checksd by roentgen examination, in order to shorten the period of disability and at the same time hasten healing and union. The ambulatory type of splint should be used as early as possible. This is judged by the physical condition of the patient and the appearance of the wound.

In caring for these cases only sufficient traction need be employed to maintain position. In fractures of the arm, abduction angle and external rotation need be guided by the position of the upper fragment.

Shoulder joint injuries should not have traction. In fractures of the elbow, flexion is preferable when possible. Forearm fractures must be held in supination. The methods of making traction, the position of election, also the splints best adapted for the various types of fracture are very ably discussed. —*Sidney O. Reese, Lincoln.*

TREATMENT OF BIRTH FRACTURES AT FORDHAM HOSPITAL. S. W. Boorstein, M. D. *Amer. Jour. of Dis. of Children*, May 1920.

The author discusses the various methods of treatment of birth fractures, vertical suspension, vertical suspension plus weight and pulley traction, modified Bradford frame with vertical suspension, oblique suspension combined with traction, and Truesdell's box splint.

He reports six cases, three of which had a fractured femur, two a fractured humerus, and the remaining case a fracture of a femur and a humerus. In these cases the Thomas knee splint with torsion traction was used. The perineal ring is not applied as tightly as in adults. The brace extends three or four inches beyond the foot. The ring is covered with flannel or chamois which can be changed every two or three days if necessary. To prevent foot drop a tongue depressor is placed on the plantar surface of the foot and held by bandage to the bars of the splint.

A roentgenogram can easily be taken and it is also easy to administer massage. The child lifts up the foot together with the brace, and thus the proper voluntary movements are made and union is hastened.

The patient can be cleaned and dressed easily and carried about whenever necessary. The braces are left on for from three to five weeks. The foot or hand has to be watched for swelling which can be prevented if the bands

are loosened up once in a while and the parts massaged. The ring of the brace must not be too wide, as it will press on the axillary vessels in the upper extremity or on the other thigh if the case is one involving the lower extremity. In the latter case a deformity may be produced.

In the author's experience with this method of treatment, both in the hospital and dispensary, the children thus far have all done well.—*Mark Cohn, M. D.*